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Tench (*Tinca tinca*) in Sicily: current knowledge and research needs for conservation and management

by

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Résumé. – La tanche (*Tinca tinca*) en Sicile : connaissances actuelles et recherches à développer pour sa conservation et sa gestion.

En dépit d'une probable introduction ancienne, on dispose de très peu d'informations sur la tanche en Sicile. Les seules données récentes se trouvent dans des études sur la répartition des poissons d'eau douce dans certaines régions de l'île (essentiellement Est et Sud-Est), et sont constituées le plus souvent de données en présence/absence, avec parfois une estimation d'abondance. La gestion actuelle des populations ne repose pas sur des données biologiques et écologiques. Ce travail répertorie les données historiques et récentes disponibles et évoque les études souhaitables pour acquérir une meilleure connaissance des populations locales en vue d'une gestion plus conservatoire.

Keywords. – *Tinca tinca* - Sicily - History - Distribution - Conservation.

Tench *Tinca tinca* (Linnaeus, 1758) is widely distributed and cultured: it is autochthonous in most of Europe and Asia, and was introduced in many areas of the world (Kottelat and Freyhof, 2007). Its IUCN Red List category is "Least Concern" (Freyhof and Kottelat, 2008). However, the regional level of threat for tench is unknown in parts of Europe, and more information needs to be collected on its status and threats in the different areas of distribution. Conservation of the various tench populations is particularly important for aquaculture purposes, as different strains of tench could differ in several features such as growth performance and resistance to parasites (Rennert *et al*., 2003).

Gandolfi *et al*. (1991) and Zerunian (2002) consider tench as autochthonous in continental Italy, as does Bianco (1995) on the basis of biogeographical data. In the Italian Red List of freshwater fish (Zerunian, 2007) tench is listed as "Near Threatened" due to the reduction of the populations caused mainly by habitat modification and pollution, but in the Italian Red List of Vertebrates (Rondini *et al*., 2013) it is listed as "Least Concern". Tench is widely farmed in Italy but Italian freshwaters have also been stocked with strains from abroad.

This work critically reviews the existing knowledge on tench in Sicily, adding new recent, unpublished findings, trying to reconstruct temporal changes of its distribution and outlines a programme of research, conservation and management in this Mediterranean island.

MATERIAL AND METHODS

Scientific literature on Sicilian freshwater fish was checked, as well as unpublished technical reports on monitoring activities in different areas of Sicily. Angling regulations of some Sicilian Provinces were downloaded from their web sites. Unpublished data from sampling activities recently done by the author are reported. Anglers and farmers have been interviewed. The information on the distribution of tench was partitioned into past (at the end of the 19th century) and present (after 1970).

RESULTS

History of tench in Sicily

Tortonese (1970) and Zerunian (2002) report tench as being autochthonous to Sicily, on the other hand Bianco and Taraborelli (1988) and Gandolfi *et al*. (1991) stated that tench was introduced into the island: in fact Bianco (1987) stated that there are no native primary/primary-like freshwater fish in Italian islands. Rafinesque-Schmaltz (1810) listed it in his book on Sicilian fish as *Cyprinus tinca* Linn. (In Italian: Ciprino tinca; in Sicilian dialect: Tenga di sciumi) as did Doderlein (1878-1879). Vinciguerra (1896) identified the Normans as having probably introduced the tench in Sicily. Sicher (1898) found tench abundant in all the rivers of the Catania Province. Vinciguerra (1896) and Scotti (1898) report a series of 17 rivers and lakes where tench could be found (Fig. 1).

Current knowledge on tench in Sicily

Distribution (Fig. 2)

There are no specific studies on the distribution of tench in Sicily: the main recent data can be found in studies on the distribution of freshwater fish and consist only of presence/absence data, sometimes with an abundance estimate, based on Moyle and Nichols (1973) Abundance Index (Faranda, 1977; Duchi, 1991; Ferrito and Tigano, 1995; Duchi and Occhipinti, 1998; Aquater, 2003; Salpietro, 2005; Duchi, 2006, 2008a, b; Termine *et al*., 2008; Duchi, 2011; Duchi and Milano, 2014). The total number of environments sampled after the 1970s of the 20th century (Fig. 2) is 72 (59 rivers/streams, 6 lakes, 5 reservoirs, 2 artificial ponds); tench was found in 20 of them (28%: 15 rivers/streams, 1 lake, 3 reservoirs, 1 farm pond). In 6 (35%) out of the 17 environments where tench was found in the past, it was sampled again recently, in 7 (41%) no tench was found and for 4 (23%) there are no recent data. As shown in table I, even in the areas where the species was found, it distribution is often extremely restricted.

More recent data show that in some environments the species is still present: for example in the Prainito stream, an environment already sampled (Duchi and Occhipinti, 1998; Salpietro, 2005; Duchi, 2006; 2008a), tench was still found in a summer 2010 survey, and a population recently (2013) found in the tributary S. Elia shows that tench is still present in the upper Simeto River system. But in some other environments, recent observations showed a reduction of its distribution: for example in the so called

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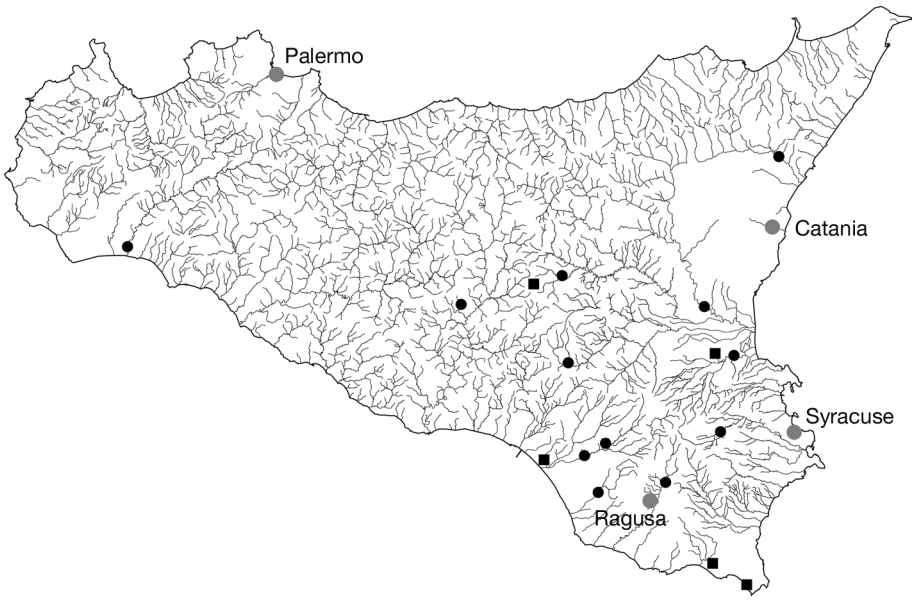

Figure 1. – Past distribution of tench in Sicily (dots: streams and rivers; squares: natural lakes and ponds).

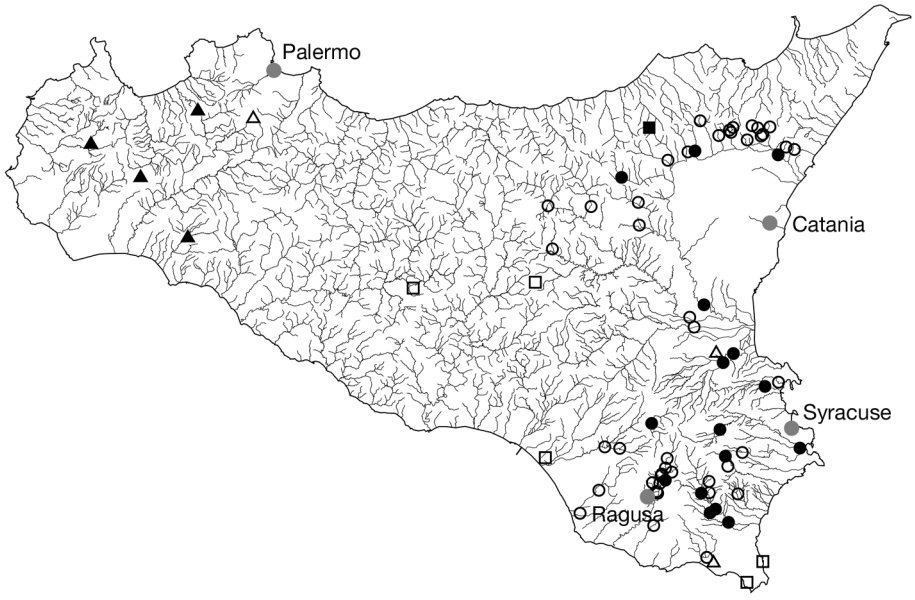

Figure 2. – Recent distribution of tench in Sicily (dots: streams and rivers; squares: natural lakes and ponds; triangles: artificial habitats. Black symbols: tench found; open symbols: tench not found).

"Oasi Macrostigma" area of the River Irminio, where tench was found in 1993 (Duchi, 2011), no tench was found after the winter 1999/2000. While in many natural environments tench disappeared and/or restricted its distribution, new populations of the species were found in artificial habitats like reservoirs and ponds for farm water supply.

Tench was found from little above the sea level up to mountain habitats (1280 m; Lake Biviere di Cesarò) and together both with salmonids and cyprinids.

Abundance, biology, genetics and threats

The Moyle and Nichols abundance index had values 1-3 in the Ragusa area and in the Tellaro River; 2-3 in the Alcantara River. No data were found on the biology and ecology of Sicilian populations. Lo Presti *et al*. (2010) report data from the Alcantara where two haplotypes were found: H1 shared by all the studied populations and H3 shared with other central and southern Italian populations. No specific study has been done on the local threats, but Sicilian freshwaters face many different impacts (Ferrito and Tigano, 1995; Duchi, 2008a; 2014) such as: water shortages, pollution, degradation of channel morphology and vegetation, urbanization, impassable weirs, introduction of alien fish species and bad angling management, all of which can affect wild tench populations.

Management

Tench was traditionally fished for food, but now there is no professional fishing in Sicilian freshwaters. Angling is practised, except in regional parks and reserves. Unfortunately angling is not well regulated and poaching not well controlled everywhere in the island. Minimum fishable length for tench is 20 cm, angling is forbidden from June 1 to June 30 and there is not a maximum number of fish that can be captured. These rules are based on national laws

Table I. – Tench in some river systems in Sicily. *: 5 in 1977-1982 and 3 in 1988-1992.

Area	River systems sampled	River systems with tench	%	Rivers sampled	Rivers with tench	%	Sampling sites	Sampling sites with tench	%
Simeto River	1	1	100	11	1	9	48	8 *	17
Tellaro River	1	1	100	6	3	50	15	5	33
Province of Siracusa	8	6	75	13	8	61	47	16	34
Province of Ragusa	7	3	43	21	3	14	50	5	10
Alcantara River	1	1	100	15	2	13	35	3	9

between 1914 and 1931, as there is not a regional law based on the biological and ecological characteristics of the Sicilian fish populations.

In 2009 in the Province of Ragusa a new angling regulation, outlined in cooperation by the Province Administration of Ragusa and the local group of the angling association FIPSAS, shifted precautionally the minimum legal size to 25 cm (TL), set a daily maximum number of captures of 3 and moved the forbidden angling period to April 15-May 31, which could be good for lakes and ponds, but probably not for streams and rivers (for example ripe females were found in Summer in Prainito stream). After that, the same was done by the Province of Siracusa. In the Province of Enna, the forbidden period is 1-30 June, the minimum legal size is 20 cm (TL) and there is no number limit, the same in the Province of Messina where there is a daily maximum number of capture of 4.

Movements of fish between rivers or lakes are reported in the past, and probably individual anglers still do that, as these kinds of activities are not well regulated and controlled. Some local administrations did stocking of tench: for example, in 2001 the administration of the Ragusa province stocked S. Rosalia reservoir and the Irminio River with fish introduced from outside Sicily, but no monitoring was made on the effects of such activities. There is a lack of information on the management of the populations in farm ponds, but stocking of tench both of Sicilian and of other areas of origin has been reported to the author by farmers and anglers.

More recently, some provinces (Ragusa and Catania) and some privates have built small hatcheries. While no production has been started yet, it is possible to estimate a potential maximum production of about 1,500,000 eggs of tench, based on the number of Zug jars in the different hatcheries.

DISCUSSION

Tench, after its probable ancient introduction in Sicily, spread in most of the habitats in the island: the historical data report this species for river systems as well as natural lakes, with a more diffuse presence in the Eastern side (probably also due to lack of data for the Western one). On the whole, tench appears today to be still present in the island, but the observations show a tendency towards a reduction in the distribution in natural habitats. According to the existing data, the area with more tench populations seems to be the Eastern side of the Hyblean Plateau (Province of Siracusa).

If the populations in natural habitats seem to be diminishing, these preliminary observations show populations of tench in reservoirs and artificial ponds for farm water supply: these artificial environments are very diffuse in Sicily and could represent a 'reserve pool' for this species.

Sicilian freshwaters have many different impacts: many areas have been heavily polluted or strongly modified or even have disappeared (like the Lentini Lake that was completely reclaimed and then, more recently, rebuilt as a reservoir). Management of the species is clearly insufficient: poor regulations, low control on poaching, angling and movements of individuals. All these factors could have contributed to the diminishing of the species, with some of them acting together.

On the base of this, it is possible to draw some recommendations.

A research plan is needed concerning:

1) a more complete control of the distribution of tench; in fact, only E-SE areas have been studied in a systematic way, but not completely; this activity could involve researchers, anglers, environmentalists, farmer organizations as well as individual farmers;

2) a study on the genetic and morphological characteristics of the populations together with their biology, ecology and threats, to show local adaptations, genetic variability and other information useful for the conservation, management and the appropriate stocking procedures.

Besides the research activity, it is necessary to start a programme of:

1) education and communication: to involve the population, 'in primis' anglers, on the importance of conserving, managing and restoring tench populations and their environment;

2) training: to rise the level of knowledge of administrators and managers and to promote 'new work' (like working in hatcheries, monitoring and enhancing populations…) in an area with high levels of unemployment.

Management prospects

The aforementioned research/monitoring programme is needed before the start of a production activity for restocking wild habitats and for food production, and it should be linked with the management activities over time. But there are conservation activities that can be started in the interim and can benefit tench: better control of angling, poaching and introduction of fish species, and all the actions that can improve habitats, such as: a more efficient use of water and wetlands restoration.

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